

## Galileo Infrared Observations of the G and R Fireballs and Splashback

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The position of the Galileo spacecraft provided the unique and fortunate opportunity to observe the Shoemaker-Levy 9 impact events directly; here we summarize the observations performed by the Near Infrared Mapping Spectrometer (NIMS). Two events (G and R) were observed, and each of these showed two qualitatively similar phases - the fireball and splashback. The G fireball light curve lasted for up to 80 seconds, and the time of maximum intensity, and the duration, increases with wavelength. The spectra show blackbody emission with absorption features from atmospheric gas outside and entrained within the expanding shock region. The temperatures vary from above 3000 K near the beginning to about 1000 K after one minute, with corresponding emitting areas of 4(10 to 100,000 km<sup>2</sup>). An adiabatic coefficient of 1.2 was derived. Using a simple model for the fireball phenomena, we find a provisional estimate for the diameter of the G fragment, assumed spherical and of unit density, of 200 meters. The opacity source which produces the observed blackbody-like spectra is speculated to be condensed refractories such as MgO and SiO<sub>2</sub>, derived from the impactor and probably containing impurities. Fireball processes accelerate material upward, to form the plumes, which then fall back as the splash. Six minutes after the initial G impact, we find the onset of splashback emissions. Spectra of this phase shows methane and water bands, in emission, superposed on a continuum. Preliminary estimates of the temperatures during this phase are 1000-2000 K, and about 10<sup>12</sup> grains of water are present in the splash. The R event is weaker but shows the same time difference between its two phases. The amount of water in the R splash is lower by at least a factor of 10.